

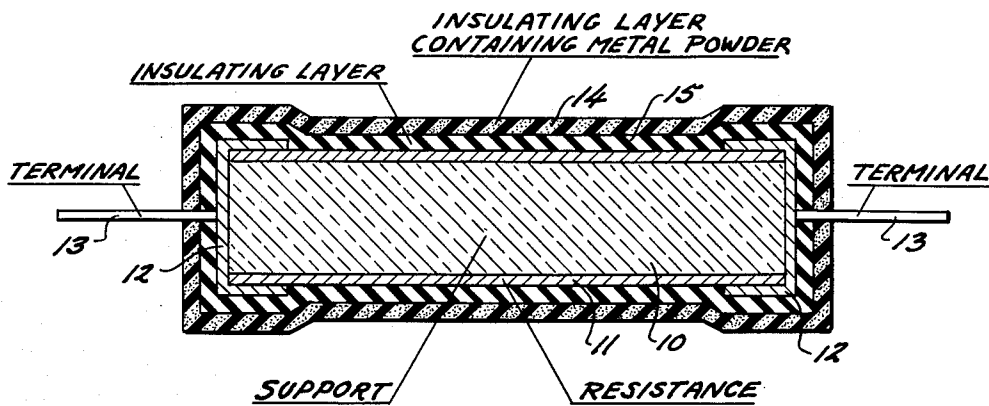
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G. CANEGALLO

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ELECTRIC RESISTORS

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INVENTOR

GIOVANNI CANEGALLO

BY

Arnesen & Schreyer
ATTORNEY

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ELECTRIC RESISTORS

Giovanni Canegallo, Varese, Italy, assignor to S.E.C.I.-Societa Elettrotecnica Chimica Italiana S.p.A., Milan, Italy, a company of Italy

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2 Claims. (Cl. 117-217)

It is well known that many electric devices such as condensers, piezoelectric laminae and particularly electric resistors of various kinds, specifically stratified resistors or resistors with a semiconductive mix as the resistance element, and those with a metal wire resistance element, are in many cases protected by applying on their surface, or by impregnating them with, insulating paints of various kinds.

The paints are used in pure condition, or admixed with fine powders of insulating materials such as talcum, titanium dioxide, alumina, silica, mica powder, and the like, and these materials are normally called "fillers."

One of the most important functions of the paint is to protect the abovementioned devices, and in particular electric resistors, from the influence of atmospheric moisture, which may cause considerable variations of the ohmic values of the resistors and of the electric characteristics in general.

An object of the present invention is to improve substantially the qualities of protection against moisture, of the insulating paints commonly used to cover the resistance elements of electric resistors.

In accordance with an aspect of the invention, the resistance element is protected by at least one layer of insulating paint in direct contact with the resistance element, and by at least one additional layer of insulating paint overlying the first mentioned layer and containing a powdered metal.

The invention is further described in detail with reference to the accompanying drawing, the single view of which is a longitudinal section of an electric resistor.

As is apparent in the drawing, an electric resistor embodying this invention may include a support 10 of ceramic or the like having a resistance element 11 on the surface of the support. Caps 12 contact the opposite ends of resistance element 11 and have terminal wires 13 extending therefrom. The resistance element 11 is protected by at least one layer 14 of an insulating paint containing approximately 10 percent, by weight, of a powdered metal.

The metals most suited for this purpose, are the light metals such as magnesium, aluminum, titanium, either pure or mixed or alloyed with one another or with other metals; but other metals, such as, copper, zinc, and the like, can be used for this purpose.

The paints forming the layer 15 provided by the present invention, may contain only the metal powders or the latter together with other "fillers" as commonly used with said paints, such as, silica powder, mica powder, talcum powder and the like.

Paints of various kinds containing metal powders have long been known, and are commonly employed in many applications; but they have never been used to protect electric resistors because their particularly desirable protective qualities against the undesirable effects of moisture were not appreciated.

The values of dielectric rigidity (disruptive strength) and insulating resistance of the paints containing metal powders are generally lower than those of the same paints in pure condition or containing only powders of electrically insulating materials and it is also owing to this fact that those paints have never been used to protect electric resistors.

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In order to avoid any disadvantageous effect of the lower dielectric rigidity and the reduced insulating resistance of the paints containing metal powders, the present invention further provides an electric resistor in which those paints are not in direct contact with the resistance element 11 of the resistor, but rather are spaced from the resistance element by one or more layers 15 of paint, of synthetic resins or of other insulating materials as commonly used for that purpose.

If one wants to further improve the superficial electric insulating characteristics of the resistors protected with paints containing metal powders, one or more additional layers of common insulating paints may be applied over the layer or layers 14.

Evidently more than the single layer 14 of paint containing metal powders may be provided, and such layers may be separated from one another by one or more layers of common paints.

From the results of numerous experimental tests carried out, it has been possible to find that for instance a silicone paint such as paint No. 966 manufactured by the St. Goban Company mixed with 10% of aluminium powder protects the resistors, of the type having a resistance element formed by a graphite layer as obtained by the cracking of hydrocarbons, much better than the same paint if used in pure condition.

Some resistors of 0.5 watt and 1MΩ of the kind mentioned above, protected with No. 966 silicone paint only, after a series of six "hot-moist" cycles according to the American standards MIL 10509 B, underwent an increase of their initial value of between 0.6 and 2%, while otherwise identical resistors protected with paint No. 966 mixed with 10% of aluminium powder, after the same test underwent increases between 0.1 and 0.3% of their starting value, which proves the protective superiority of the paint containing metal powder.

Although an illustrative embodiment of the invention has been described in detail herein with reference to the accompanying drawing, it is to be understood that the invention is not limited to that precise embodiment, and that various changes and modifications may be effected therein without departing from the scope or spirit of the invention, except as defined in the appended claims.

I claim:

1. An electric resistor comprising a resistance element, at least one layer of insulating paint in direct contact with said resistance element, and at least one additional layer of insulating paint overlying the first mentioned layer and containing approximately 10% of a powdered metal selected from the group consisting of magnesium, aluminum, titanium, copper, zinc and alloys thereof, to avoid changes in the resistance of said element as a result of exposure to moisture.

2. An electric resistor as in claim 1; wherein at least one of said layers of insulating paint further contain filler selected from the group consisting of powders of talcum, titanium dioxide, alumina, silica and mica.

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